

Where conditions are favourable a few miners combine small farming with their mine-work, or alternate between farming and mining. Surface work, however, whether in town or country, is often repellant to the miner, who has grown accustomed to the even temperature of the pits.

The coal-mine workers are organized into unions. There is, generally speaking, a union in connection with each of the principal collieries, a local federation of such unions occupying a well-defined mining field, and finally a national federation of the unions of the Dominion. These unions discharge all the usual functions associated with trades-unions, and in one or two cases promote the organization of co-operative stores.

5. ORGANIZATION OF COAL-PRODUCTION.

(i.) The factors determining the *localization* of most industries are many and of varying force; with coal-mining they are few, simple, and direct in their action; coal must be mined where nature has placed it, and only there. The geographical distribution of the industry in New Zealand has already been indicated. The fact that it is not concentrated in one small area is another reason why the production has not been monopolized.

(ii.) The *scale of production*, too, depends largely upon natural conditions; one essential condition is a plentiful supply of coal. Wherever this exists, together with a large market for the product, the desire to reduce the cost of production per ton will extend the scale of operations of a particular colliery to the point where the maximum net return is reached. This point will not generally be attained until the original output has been enlarged by successive increments. Whether the scale of production be measured by coal produced, amount of capital used, or number of men employed, the mines in New Zealand do not provide examples of the large scale reached in many of the important fields abroad. Reference to Table 14 above will show that the two main mines of the Westport Coal Company (Limited) at Millerton and Denniston are on the largest scale found in the Dominion; then follow those of the Taupiri, Westport-Stockton, Blackball, and Kaitangata Companies, and the State, all of which are large mines, measured by local standards. Of the newer mines, the Pukemiro promises to grow most rapidly. There have been no recent amalgamations of companies with the view to establish economy of production by reducing the costs of management and administration per ton, or by concentration of the labour available upon the most promising parts of a given field instead of the most profitable parts of the several mines. In some cases—*e.g.*, the Westport, Blackball, and Northern Companies—the companies' activities include the carriage of coal at sea by their own colliers; in other cases, as at Kaitangata and Waipa, they provide railways for its transport to the most convenient point of loading in the State railway system.

(iii.) In connection with existing mines a considerable amount of *development work* is carried out in the shape of boring, tunnelling, &c., in order to test the nature and disposition of the coal-measures on the field and to ascertain the direction in which the most promising results may be expected.

(iv.) *The specialization or division of labour* has been already referred to in the preceding section, and appears to be as highly developed as circumstances warrant. In the strict sense of the term the coal-miners are the workers who hew the coal from the face of the seam. They work in pairs, each pair at a face, and the Coal-mines Act provides, in the interests of safety, that no man may be put in charge of a place until he has worked two years underground. His mate may have had no previous underground experience.

(v.) *Methods of Working*.—The methods of winning the coal, after the shafts and drives have been made, fall into two main classes: the bord-and-pillar method and the longwall method. The former is the one in general use in New Zealand, owing to the height of the seams and the weak character of the roof. The longwall system is used to a very slight extent in some small mines; and in some other cases the coal is merely quarried in an "opencast" mine. The following description of the common method, as followed on the Grey field, is taken from Bulletin No. 13 of the Geological Survey (p. 23):—

"The standard width of bord is 16 ft. to 18 ft., and that of pillars may be from 30 ft. to 75 ft. Thus the bords may be set out from the headings with centres varying from 48 ft. to 90 ft.

"Owing to the seams hitherto worked being as a rule over 8 ft. thick, longwall working has been little employed. This method, however, has been used in the Point Elizabeth State Mine No. 1 for thin portions of Nos. 1 and 2 seams.

"In breaking down coal the miner uses the time-honoured method of cutting and holing, followed by wedging, as little as possible. Holes having been bored by auger-drills, and the minimum amount of other preparation done, an explosive is employed to break out the coal. After cleaning and squaring up the face, the coal-getter repeats the various operations of cutting (if necessary), boring, and blasting. Where the seam is thick he works with a rough kind of bench, keeping the upper part of his face well forward.

"The method of working the pillars is to remove slices or 'lifts' 14 ft. to 15 ft. wide, starting from the end or stenton farthest in and working backwards to the main headings. As a rule, the removal of the last part or stump is troublesome, and it is in places necessary to leave a portion of the pillar on account of the danger or expense of removing it.

"The broken coal is filled into small trucks (tubs, boxes, skips, &c.), containing from 10 cwt. to 15 cwt. From the working-face the coal is transported by hand-labour, and in most cases with the aid of a jig also, to the level below. Hence it is hand-trucked, or drawn by horses, to the main haulage-road, and finally is conveyed to the surface by some form of rope haulage. On the surface the coal may or may not be passed over a picking-belt and through sizing-screens before it reaches the railway-trucks."